

**REMARKS**

Applicant respectfully requests reconsideration. Claims 1-38 were pending in this application with claims 33-38 being withdrawn from consideration. Claims 7-11 and 33-38 have been canceled without prejudice or disclaimer. Claims 1, 6, 12, 14, 19, 21, 22 and 27 have been amended. As described further below, claim 1 was amended to further recite an intermediate layer and that the gallium nitride material layer is formed on the intermediate layer. Claims 6, 12, 14, 19, 21, 22 and 27 were amended to be consistent with the amendment to claim 1 and/or to correct minor errors.

As a result of this amendment, 1-6 and 12-32 are now pending for examination, with claims 1, 29, 30 and 31 being independent claims. No new matter has been added.

**Objection to Claim 14**

To address the objection to claim 14, Applicant has amended the claim to recite “a substrate”. Accordingly, Applicant respectfully requests withdrawal of this objection.

**Rejection of Claims 1-3, 5-7, 10, 11, 19-21, 23 and 25**

Claims 1-3, 5-7, 10, 11, 19-21, 23 and 25 were rejected under 35 U.S.C. §102(b) as being anticipated by WO 98/44569 (Ito).<sup>1</sup>

Without acceding to the correctness of this rejection, Applicant has amended independent claim 1 to recite that the semiconductor structure includes an intermediate layer formed on the silicon germanium component and that the gallium nitride material layer is formed on the intermediate layer.

Ito fails to disclose the specific claimed arrangement of a gallium nitride material layer formed over a silicon germanium component. Ito does provide a list of a number of possible substrates, which includes silicon germanium, and a list of a number of possible semiconductor materials which includes gallium nitride. However, it is clear from Ito, that not all of the possible substrates may be combined with all of the possible semiconductor materials. Specifically, Ito states that the substrate “needs to be *transparent* to light emitted from the light

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<sup>1</sup> Applicant is relying on the fact that US Pat. No. 6,583,442 is the English equivalent of WO 98/44569 as stated in the Office Action.

emitter to be obtained." (Emphasis added). (See Ito, Col. 3, lines 40-45). As known to those skilled in the art, a silicon germanium substrate is *not transparent* to light emitted from a gallium nitride material region. (Emphasis added). The band gap of silicon germanium is such that it absorbs light of the wavelength emitted by gallium nitride materials. Therefore, Ito teaches away from a structure that includes a gallium nitride material layer and a silicon germanium component.

Because Ito fails to disclose, and in fact teaches away from, the semiconductor structure of independent claim 1, this claim is patentable over Ito. The remaining claims that stand rejected on this ground either have been cancelled or depend from claim 1 and, thus, are patentable for at least this reason. Accordingly, Applicant respectfully respects withdrawal of the claim rejections on this ground.

#### Rejection of Claims 1-3, 7, 9 and 21

Claims 1-3, 7, 9 and 21 were rejected under 35 U.S.C. §102(e) as being anticipated by US Patent Publication No. 2002/0060315 (Yokogawa).

Without acceding to the correctness of this rejection, Applicant has amended independent claim 1 to include a limitation similar to that of dependent claim 11 which does not stand rejected on this ground. Moreover, Applicant has also amended claim 1 to recite that the gallium nitride material component is formed on an intermediate layer.

Because Yokogawa fails to disclose the structure recited in independent claim 1, this claim is novel over Yokogawa. The remaining claims that stand rejected on this ground either have been cancelled or depend from claim 1 and, thus, are patentable for at least this reason. Accordingly, Applicant respectfully requests withdrawal of the claim rejections on this ground.

#### Rejection of Claims 15, 24 and 26

Claims 15, 24 and 26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ito. Claims 15, 24 and 26 all depend from independent claim 1 which is patentable over Ito for reasons discussed above. Therefore, these dependent claims are also patentable over Ito for at least those reasons. Accordingly, Applicant respectfully requests withdrawal of the claim rejections on this ground.

Rejection of Claims 4, 8, 13, 14 and 30

Claims 4, 8, 13, 14 and 30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ito in view of US Patent No. 6,589,335 (Bulsara).

Claims 4, 13 and 14 depend from claim 1 which is patentable over Ito for reasons discussed above. Bulsara fails to provide the deficiencies of Ito with respect to independent claim 1 and, thus, also its dependent claims. Therefore, claims 4, 8, 13 and 14 are patentable over the combination of Ito in view of Bulsara.

Independent claim 30 is directed to a semiconductor structure that comprises a silicon substrate, a silicon germanium layer and a gallium nitride material layer. As noted above, Ito fails to disclose, and in fact teaches away from, a semiconductor structure that includes a silicon germanium component and a gallium nitride material layer. Therefore, any modification of the device of Ito to include a silicon germanium component and a gallium nitride material layer would render the Ito light emitting device unsuitable for its intended purpose because a silicon germanium component is not transparent to light emitted by a gallium nitride material layer.

Because Ito teaches away from being modified to provide the structure of claim 30, there is no motivation to combine Ito and Bulsara in the manner stated in the Office Action. Thus, a *prima facie* case of obviousness has not been met and independent claim 30 is patentable over the combination.

Claim 8 has been cancelled.

Accordingly, Applicant respectfully requests withdrawal of the rejection on this ground.

Rejection of Claim 12

Claim 12 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ito in view of US Patent No. 5,874,747 (Redwing).

Claim 12 depends from claim 1 which is patentable over Ito for reasons described above. Redwing fails to provide the deficiencies of Ito with respect to independent claim 1 and, therefore, also with respect to its dependent claims. Therefore, claim 12 is patentable over the combination of Ito in view of Redwing. Accordingly, Applicant respectfully requests withdrawal of the rejection on this ground.

Rejection of Claims 16-18, 22 and 29

Claims 16-18, 22 and 29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ito in view of US Patent No. 5,403,673 (Haga).

Claims 16-18 and 22 depend from independent claim 1 which is patentable over Ito for reasons discussed above. Haga fails to provide the deficiencies of Ito with respect to independent claim 1 and, therefore, its dependent claims. Thus, claims 16-18 and 22 are patentable over the combination of Ito in view of Haga.

Independent claim 29 is directed to a semiconductor structure that comprises a silicon germanium component and a gallium nitride material layer formed on the silicon germanium component which has a crack level of less than  $0.005 \text{ um}/\text{um}^2$ . As noted above, Ito fails to disclose, and in fact teaches away from, a semiconductor structure that includes a silicon germanium component and a gallium nitride material layer. Therefore, any modification of the device of Ito to include a silicon germanium component and a gallium nitride material layer would render the Ito light emitting device unsuitable for its intended purpose because a silicon germanium component is not transparent to light emitted by a gallium nitride material layer.

Because Ito teaches away from being modified to provide the structure of claim 29, there is no motivation to combine Ito and Haga in the manner stated in the Office Action. Thus, a *prima facie* case of obviousness has not been met and independent claim 29 is patentable over the combination.

Moreover, there is no teaching in Ito or Haga regarding how to obtain a gallium nitride material layer formed on a silicon germanium component and having the very low crack level claimed.

Accordingly, Applicant respectfully requests withdrawal of the claim rejections on this ground.

Rejection of Claims 27, 28, 31 and 32

Claims 27, 28, 31 and 32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ito in view of US Patent No. 6,563,143 (Gao) and/or US Patent Publication No. 2002/0060317 (Ramdani).

Claims 27 and 28 depend from independent claim 1. Neither Gao nor Ramdani provide the deficiencies of Ito with respect to independent claim 1 and, thus, also with respect to its dependent claims. Thus, dependent claims 27 and 28 are patentable over the combinations of Ito in view of Gao and/or Ramdani.

Independent claim 31 is directed to a semiconductor structure that comprises a silicon germanium component and a gallium nitride material component. As noted above, Ito fails to disclose, and in fact teaches away from, a semiconductor structure that includes a silicon germanium component and a gallium nitride material layer. Therefore, any modification of the device of Ito to include a silicon germanium component and a gallium nitride material layer would render the Ito light emitting device unsuitable for its intended purpose because a silicon germanium component is not transparent to light emitted by a gallium nitride material layer.

Because Ito teaches away from being modified to provide the structure of claim 31, there is no motivation to combine Ito in view of Gao and/or Ramdani in the manner stated in the Office Action. Thus, a prima facie case of obviousness has not been met and independent claim 31, and its dependent claim 32, are patentable over the combination.

Accordingly, Applicant respectfully requests withdrawal of the claim rejections on this ground.

**CONCLUSION**

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,  
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